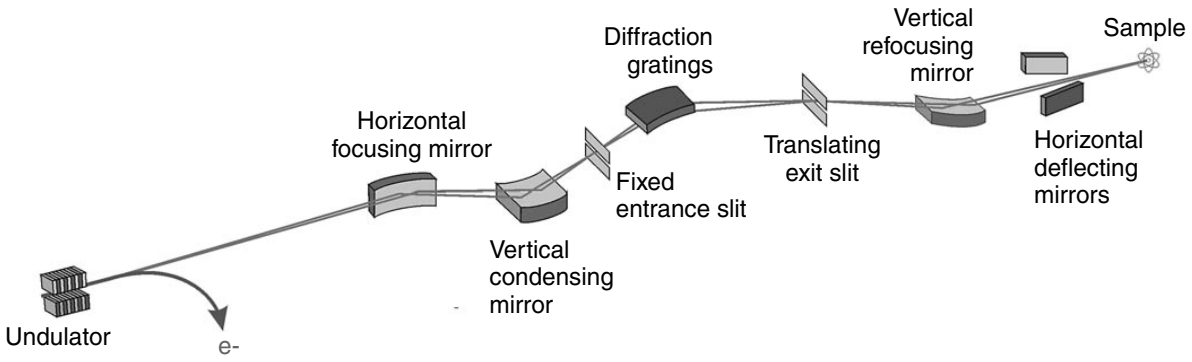
High-Resolution Spectroscopy of Correlated Electron Systems • Beamline 10.0.1

Berkeley Lab • University of California

Beamline Specifications

Photon Energy Range (eV)	Photon Flux (photons/s/0.01%BW)	Spectral Resolution (E/ΔE)	Spot Size (μm)	Availability
17–340	$\leq 10^{12}$ (resolution dependent)	>10,000 (selectable by slit width)	100–1500 (h) 100–1500 (v) (dependent upon endstation and exit slit setting)	NOW



Schematic layout of Beamline 10.0.1 optics.

Beamline 10.0.1 is a high-resolution undulator beamline with three branches. Two of the branches are dedicated to the Atomic and Molecular Facility (AMF) and the third to the High Energy Resolution Spectrometer (HERS) endstation.

The HERS endstation is designed for angle-resolved photoemission experiments on highly correlated electron systems in condensed matter. The AMF is designed to study highly correlated systems in the gas phase and contains three advanced experimental endstations: (1) the Electron Spin Polarization (ESP) endstation, (2) the collinear Ion-Photon Beamline (IPB) endstation, and (3) the High-Resolution Atomic and Molecular Electron Spectrometer (HiRAMES). All of these endstations are described in separate data sheets.

Equipped with a spherical-grating monochromator, Beamline 10.0.1 provides an intense beam of photons at very high spectral resolution over the photon energy range from 17 to 340 eV. Over most of this photon energy range, the beamline can deliver more than 10^{12} photons/s to the sample at resolving powers (E/ΔE) exceeding 10,000. At the expense of resolution, up to 10^{14} photons/s can be obtained over some of this energy range. Alternatively, experimenters can achieve very high resolving power (~64,000) by reducing the monochromator slits and hence the photon flux. The spherical-grating monochromator covers the spectral range with three gratings (380, 925, and 2100 lines/mm). A polarizer comprising four mirrors acting as quarter-wave phase retarders can produce circularly polarized radiation at photon energies from 20 to 60 eV. For details of the optical design of the beamline, visit the Beamline 10.0.1 Web site at *bl10srvr.als.lbl.gov*. ■

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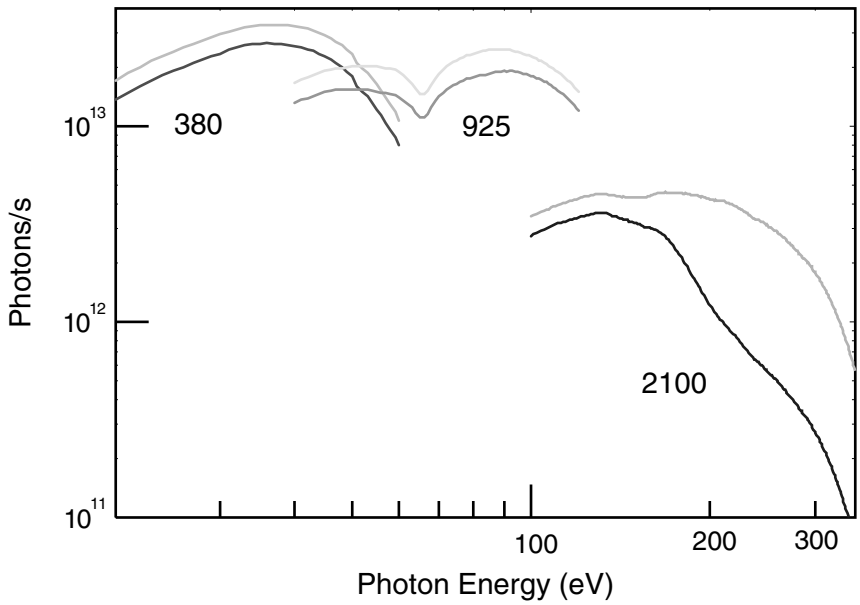
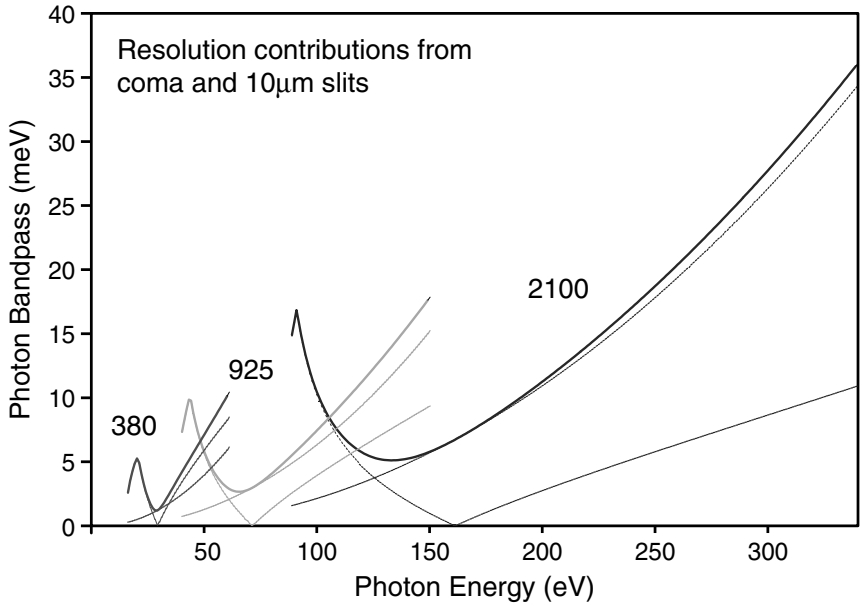


Calculated flux of radiation from Beamline 10.0.1 at a resolving power (E/ΔE) of 10,000. There are two curves for each grating (as indicated on the figure by their line densities; 380, 925, 2100 lines/mm). The upper curve corresponds to the flux on the central branchline and the lower curve the flux on either of the side branch lines.



Contributions of 10-μm slits and coma to the resolution of Beamline 10.0.1 for each of the three gratings. *The contributions of the slits are shown by the light lines that increase with photon energy and the contributions from grating coma by the light lines that dip near the center of the range of the grating. The sum of the two contributions is shown by the heavier line.*

This beamline is available to independent investigators by submitting a proposal.

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